

*Claims as enclosed to IPER*

5 1. A process for preparing at least one unsaturated alcohol (B), which comprises the steps (I) to (III) below:

(I) reaction of at least one alkali metal hydroxide or alkaline earth metal hydroxide with at least one alcohol (A) in at least one organic solvent (L) to give a mixture (G-I) comprising at least the alcohol (A), the solvent (L) and an alkoxide (AL);

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(II) reaction of at least one carbonyl compound of the formula  $R-CO-R'$  with at least one alkyne of the formula  $R''-C\equiv C-H$  and the mixture (G-I) obtained in step (I) to give a mixture (G-II) comprising at least the alcohol (A), the solvent (L) and an unsaturated alcohol (B);

15 (III) distillation of the mixture (G-II) obtained in step (II) to give the alcohol or alcohols (B) and a mixture (G-III) comprising the solvent (L) and the alcohol (A),

where the solvent (L) obtained in step (III) and the alcohol (A) obtained in step (III) are recycled as a mixture to step (I), wherein steps (I) to (III) are carried out continuously.

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2. A process for preparing at least one hydrogenated alcohol (C), which comprises the steps (I) to (III') below:

(I) reaction of at least one alkali metal hydroxide or alkaline earth metal hydroxide with at least one alcohol (A) in at least one organic solvent (L) to give a mixture (G-I) comprising at least the alcohol (A), the solvent (L) and an alkoxide (AL);

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(II) reaction of at least one carbonyl compound of the formula  $R-CO-R'$  with at least one alkyne of the formula  $R''-C\equiv C-H$  and the mixture (G-I) obtained in step (I) to give a mixture (G-II) comprising at least the alcohol (A), the solvent (L) and an unsaturated alcohol (B);

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(II') hydrogenation of at least one unsaturated alcohol (B) in the mixture obtained from step (II) to give a mixture (G-II') comprising at least one hydrogenated alcohol (C), the alcohol (A) and the solvent (L);

5 (III') distillation of the mixture (G-II') obtained in step (II') to give the alcohol or alcohols (C) and a mixture (G-III') comprising the solvent (L) and the alcohol (A),

wherein the solvent (L) obtained in step (III') and the alcohol (A) obtained in step (III') are recycled as a mixture to step (I).

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3. A process as claimed in claim 1 or 2, wherein the step (II) comprises the substeps (i) to (vi) below:

15 (i) reaction of at least one carbonyl compound of the formula  $R-CO-R'$  with at least one alkyne of the formula  $R''-C\equiv C-H$  and the mixture (G-I) obtained in step (I) to give a mixture (M-i);

(ii) hydrolysis of the mixture (M-i) obtained from substep (i) to give a multiphase mixture (M-ii) comprising at least one organic phase;

(iii) separation of the organic phase or phases from the multiphase mixture (M-ii) obtained in substep (ii);

20 (iv) extraction of the organic phase or phases separated off in step (iii);

(v) neutralization of the organic phase or phases extracted in step (iv) to give a mixture (M-v) comprising at least one alkali metal salt or alkaline earth metal salt;

25 (vi) separation of the alkali metal salt(s) or alkaline earth metal salt(s) from the mixture (M-v) obtained in substep (v) to give a mixture (G-II) comprising at least the alcohol (A), the solvent (L) and an unsaturated alcohol (B).

4. A process as claimed in claim 3, wherein the extraction in substep (iv) is carried out as a countercurrent extraction.

5. A process as claimed in any of claims 1 to 4 which comprises the further step (IV):  
(IV) finishing of the alcohol or alcohols B or C prepared in step (II) or in steps (II) and (II') and obtained in step (III) or in step (III').

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6. A process as claimed in any of claims 1 to 5, wherein the radicals R and R' of the carbonyl compound of the formula  $R-CO-R'$  are identical or different and are straight-chain, branched or cyclic, saturated or unsaturated aliphatic radicals.

- 10 7. A process as claimed in claim 6, wherein the carbonyl compound of the formula  $R-CO-R'$  is acetone or methyl isobutyl ketone.

8. A process as claimed in any of claims 1 to 7, wherein the alkyne of the formula  $R''-C\equiv C-H$  is acetylene.

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9. An integrated process for preparing at least one unsaturated alcohol (B), which comprises the continuously operated steps (a) to (h) below:

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- (a) reaction of at least one alkali metal hydroxide or alkaline earth metal hydroxide with at least one alcohol (A) in at least one organic solvent (L) using the aqueous phase (P-d) obtained in step (d) to give a mixture (G-a) comprising at least the solvent (L), the alcohol (A) and an alkoxide (AL) and to give an aqueous phase (P-a) which is passed to step (e);

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- (b) reaction of at least one carbonyl compound of the formula  $R-CO-R'$  with at least one alkyne of the formula  $R''-C\equiv C-H$  and the mixture (G-a) obtained in step (a) to give a mixture (G-b) comprising at least one unsaturated alcohol (B), where the reaction is preferably carried out in a reaction mixing pump;
- (c) hydrolysis of the mixture (G-b) from step (b) using the aqueous phase (P-e) obtained in step (e) to give a multiphase mixture (M-c) comprising at least one organic phase and at least one aqueous phase;

- (d) separation of the organic phase or phases from the multiphase mixture (M-c) obtained in step (c) to give at least one aqueous phase (P-d) which is recycled to step (a);
- 5 (e) countercurrent extraction of the organic phase or phases separated off in step (d) using the aqueous phase (P-a) obtained in step (a) to give an aqueous phase (P-e) which is recycled to step (c);
- (f) neutralization of the organic phase or phases obtained in step (e) to give a mixture (G-f) comprising at least one alkali metal salt or alkaline earth metal salt and also at least the alcohol (A), the solvent (L) and the unsaturated alcohol or alcohols (B);
- 10 (g) separation of the alkali metal salt(s) or alkaline earth metal salt(s) from the mixture (G-f) obtained in step (f) to give a mixture (G-g) comprising at least the alcohol (A), the solvent (L) and the unsaturated alcohol or alcohols (B);
- 15 (h) distillation of the mixture (G-g) obtained in step (g) to give the unsaturated alcohol or alcohols (B), to give a mixture (M-h) comprising the solvent (L) and the alcohol (A) and to give a mixture (G-h) comprising small amounts of the unsaturated alcohol or alcohols (B), where the solvent (L) and the alcohol (A) are recycled as a mixture to step (a) and the mixture (G-h) comprising small
- 20 amounts of the unsaturated alcohol or alcohols (B) is recycled to step (g).
10. An integrated process for preparing at least one hydrogenated alcohol (C), which comprises the continuously operated steps (a) to (g) as claimed in claim 9 and also the continuously operated steps (g') and (h') which are carried out after step (g):
- 25 (g') hydrogenation of the unsaturated alcohol or alcohols (B) in the mixture (G-g) obtained from step (g) to give a mixture (G-g') comprising at least the alcohol (A), the solvent (L) and at least one hydrogenated alcohol (C);
- (h') distillation of the mixture (G-g') obtained in step (g') to give the hydrogenated alcohol or alcohols (C), to give a mixture (M-h') comprising the solvent (L) and
- 30 the alcohol (A) and to give a mixture (G-h') comprising small amounts of the

hydrogenated alcohol or alcohols (C), where the solvent (L) and the alcohol (A) are recycled as a mixture to step (a) and the mixture (G-h') comprising small amounts of the hydrogenated alcohol or alcohols (C) is recycled to step (g).

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